

*Ephemeris for Physical Observations*

| Greenwich<br>Noon.<br>1882. | Angle of<br>Position of<br>$\Upsilon$ 's Axis. | Latitude of<br>Earth<br>above $\Upsilon$ 's Equator. |        | Annual<br>Parallax<br>$\Lambda-L$ . | O-L.   | Long. of<br>$\Upsilon$ 's Central<br>Meridian. |
|-----------------------------|------------------------------------------------|------------------------------------------------------|--------|-------------------------------------|--------|------------------------------------------------|
| Aug. 2                      | 357°538                                        | +2°551                                               | +2°680 | -8°445                              | 52°319 | 108°08                                         |
| 7                           | 357°973                                        | 2°537                                                | 2°669  | 8°946                               | 51°381 | 139°53                                         |
| 12                          | 358°392                                        | 2°524                                                | 2°657  | 9°411                               | 50°479 | 171°03                                         |
| 17                          | 358°792                                        | 2°511                                                | 2°645  | 9°836                               | 49°618 | 202°59                                         |
| 22                          | 359°173                                        | 2°498                                                | 2°633  | 10°216                              | 48°802 | 234°21                                         |
| 27                          | 359°531                                        | 2°485                                                | 2°621  | 10°549                              | 48°033 | 265°88                                         |
| Sept. 1                     | 359°866                                        | +2°473                                               | +2°609 | -10°832                             | 47°315 | 297°62                                         |
| 6                           | 0°175                                          | 2°462                                                | 2°597  | 11°060                              | 46°652 | 329°42                                         |
| 11                          | 0°457                                          | 2°451                                                | 2°584  | 11°229                              | 46°047 | 1°29                                           |
| 16                          | 0°711                                          | 2°441                                                | 2°572  | 11°337                              | 45°504 | 33°23                                          |
| 21                          | 0°933                                          | 2°431                                                | 2°559  | 11°380                              | 45°028 | 65°24                                          |
| 26                          | 1°123                                          | 2°423                                                | 2°546  | 11°353                              | 44°621 | 97°31                                          |
| Oct. 1                      | 1°278                                          | +2°415                                               | +2°533 | -11°252                             | 44°288 | 129°46                                         |
| 6                           | 1°398                                          | 2°409                                                | 2°520  | 11°075                              | 44°031 | 161°69                                         |
| 11                          | 1°481                                          | 2°403                                                | 2°506  | 10°819                              | 43°854 | 193°98                                         |
| 16                          | 1°525                                          | 2°399                                                | 2°493  | 10°482                              | 43°758 | 225°34                                         |
| 21                          | 1°531                                          | 2°395                                                | 2°479  | 10°062                              | 43°746 | 258°78                                         |
| 26                          | 1°498                                          | 2°392                                                | 2°466  | 9°558                               | 43°817 | 291°28                                         |
| 31                          | 1°426                                          | 2°390                                                | 2°452  | 8°972                               | 43°972 | 323°85                                         |
| Nov. 5                      | 1°316                                          | +2°389                                               | +2°438 | -8°303                              | 44°209 | 356°48                                         |
| 10                          | 1°168                                          | 2°389                                                | 2°424  | 7°554                               | 44°526 | 29°17                                          |
| 15                          | 0°985                                          | 2°389                                                | 2°409  | 6°730                               | 44°920 | 61°91                                          |
| 20                          | 0°769                                          | 2°389                                                | 2°395  | 5°837                               | 45°382 | 94°69                                          |
| 25                          | 0°524                                          | 2°389                                                | 2°381  | 4°882                               | 45°907 | 127°49                                         |
| 30                          | 0°255                                          | 2°389                                                | 2°366  | 3°874                               | 46°485 | 160°31                                         |
| Dec. 5                      | 359°965                                        | +2°388                                               | +2°351 | -2°822                              | 47°108 | 193°14                                         |
| 10                          | 359°659                                        | 2°387                                                | 2°336  | 1°738                               | 47°762 | 225°97                                         |
| 15                          | 359°345                                        | 2°384                                                | 2°321  | -0°634                              | 48°436 | 258°77                                         |
| 20                          | 359°027                                        | 2°381                                                | 2°306  | +0°476                              | 49°117 | 291°55                                         |
| 25                          | 358°713                                        | 2°377                                                | 2°291  | 1°578                               | 49°791 | 324°28                                         |
| 30                          | 358°408                                        | 2°372                                                | 2°276  | 2°661                               | 50°446 | 356°94                                         |

June 1882.

Observations of Jupiter.

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of Jupiter, 1882-83. By A. Marth, Esq.

| Corr. for<br>Phase. | Equat.<br>Diam.    | Phase<br>pr. limb. | Polar<br>Diam.     | Diff. of<br>Limbs<br>in R.A. | Phase<br>pr. limb. | d.                 | w.                  | Greenwich<br>Noon.<br>1882. |    |
|---------------------|--------------------|--------------------|--------------------|------------------------------|--------------------|--------------------|---------------------|-----------------------------|----|
|                     |                    |                    |                    | <sup>s</sup>                 | <sup>s</sup>       | <sup>o</sup>       | <sup>o</sup>        |                             |    |
| +0 <sup>o</sup> 31  | 34 <sup>o</sup> 28 | 0 <sup>o</sup> 19  | 32 <sup>o</sup> 10 | 2 <sup>o</sup> 479           | 0 <sup>o</sup> 013 | 8 <sup>o</sup> 44  | 268 <sup>o</sup> 86 | Aug.                        | 2  |
| 35                  | 34 <sup>o</sup> 63 | 21                 | 32 <sup>o</sup> 43 | 2 <sup>o</sup> 505           | 0 <sup>o</sup> 015 | 8 <sup>o</sup> 94  | 268 <sup>o</sup> 88 |                             | 7  |
| 38                  | 35 <sup>o</sup> 01 | 24                 | 32 <sup>o</sup> 78 | 2 <sup>o</sup> 533           | 0 <sup>o</sup> 017 | 9 <sup>o</sup> 40  | 268 <sup>o</sup> 91 |                             | 12 |
| 42                  | 35 <sup>o</sup> 41 | 26                 | 33 <sup>o</sup> 16 | 2 <sup>o</sup> 563           | 0 <sup>o</sup> 019 | 9 <sup>o</sup> 83  | 268 <sup>o</sup> 93 |                             | 17 |
| 45                  | 35 <sup>o</sup> 84 | 28                 | 33 <sup>o</sup> 56 | 2 <sup>o</sup> 594           | 0 <sup>o</sup> 021 | 10 <sup>o</sup> 21 | 268 <sup>o</sup> 94 |                             | 22 |
| 48                  | 36 <sup>o</sup> 30 | 31                 | 33 <sup>o</sup> 99 | 2 <sup>o</sup> 627           | 0 <sup>o</sup> 022 | 10 <sup>o</sup> 54 | 268 <sup>o</sup> 96 |                             | 27 |
| +0 <sup>o</sup> 51  | 36 <sup>o</sup> 78 | 0 <sup>o</sup> 33  | 34 <sup>o</sup> 44 | 2 <sup>o</sup> 663           | 0 <sup>o</sup> 024 | 10 <sup>o</sup> 82 | 268 <sup>o</sup> 98 | Sept.                       | 1  |
| 55                  | 37 <sup>o</sup> 19 | 35                 | 34 <sup>o</sup> 92 | 2 <sup>o</sup> 701           | 0 <sup>o</sup> 025 | 11 <sup>o</sup> 05 | 268 <sup>o</sup> 99 |                             | 6  |
| 55                  | 37 <sup>o</sup> 83 | 36                 | 35 <sup>o</sup> 43 | 2 <sup>o</sup> 740           | 0 <sup>o</sup> 025 | 11 <sup>o</sup> 22 | 269 <sup>o</sup> 01 |                             | 11 |
| 56                  | 38 <sup>o</sup> 39 | 37                 | 35 <sup>o</sup> 96 | 2 <sup>o</sup> 781           | 0 <sup>o</sup> 027 | 11 <sup>o</sup> 33 | 269 <sup>o</sup> 03 |                             | 16 |
| 56                  | 38 <sup>o</sup> 98 | 38                 | 36 <sup>o</sup> 50 | 2 <sup>o</sup> 823           | 0 <sup>o</sup> 028 | 11 <sup>o</sup> 37 | 269 <sup>o</sup> 05 |                             | 21 |
| 56                  | 39 <sup>o</sup> 58 | 39                 | 37 <sup>o</sup> 06 | 2 <sup>o</sup> 866           | 0 <sup>o</sup> 028 | 11 <sup>o</sup> 34 | 269 <sup>o</sup> 07 |                             | 26 |
| +0 <sup>o</sup> 55  | 40 <sup>o</sup> 20 | 0 <sup>o</sup> 39  | 37 <sup>o</sup> 64 | 2 <sup>o</sup> 911           | 0 <sup>o</sup> 028 | 11 <sup>o</sup> 24 | 269 <sup>o</sup> 10 | Oct.                        | 1  |
| 53                  | 40 <sup>o</sup> 83 | 38                 | 38 <sup>o</sup> 24 | 2 <sup>o</sup> 957           | 0 <sup>o</sup> 028 | 11 <sup>o</sup> 06 | 269 <sup>o</sup> 13 |                             | 6  |
| 51                  | 41 <sup>o</sup> 48 | 37                 | 38 <sup>o</sup> 84 | 3 <sup>o</sup> 003           | 0 <sup>o</sup> 027 | 10 <sup>o</sup> 81 | 269 <sup>o</sup> 17 |                             | 11 |
| 48                  | 42 <sup>o</sup> 12 | 35                 | 39 <sup>o</sup> 44 | 3 <sup>o</sup> 050           | 0 <sup>o</sup> 025 | 10 <sup>o</sup> 47 | 269 <sup>o</sup> 21 |                             | 16 |
| 44                  | 42 <sup>o</sup> 76 | 33                 | 40 <sup>o</sup> 04 | 3 <sup>o</sup> 097           | 0 <sup>o</sup> 024 | 10 <sup>o</sup> 05 | 269 <sup>o</sup> 26 |                             | 21 |
| 40                  | 43 <sup>o</sup> 39 | 30                 | 40 <sup>o</sup> 63 | 3 <sup>o</sup> 143           | 0 <sup>o</sup> 022 | 9 <sup>o</sup> 55  | 269 <sup>o</sup> 32 |                             | 26 |
| 35                  | 44 <sup>o</sup> 01 | 27                 | 41 <sup>o</sup> 21 | 3 <sup>o</sup> 187           | 0 <sup>o</sup> 020 | 8 <sup>o</sup> 96  | 269 <sup>o</sup> 38 |                             | 31 |
| +0 <sup>o</sup> 30  | 44 <sup>o</sup> 60 | 0 <sup>o</sup> 23  | 41 <sup>o</sup> 76 | 3 <sup>o</sup> 230           | 0 <sup>o</sup> 017 | 8 <sup>o</sup> 29  | 269 <sup>o</sup> 46 | Nov.                        | 5  |
| 25                  | 45 <sup>o</sup> 15 | 20                 | 42 <sup>o</sup> 28 | 3 <sup>o</sup> 271           | 0 <sup>o</sup> 014 | 7 <sup>o</sup> 55  | 269 <sup>o</sup> 55 |                             | 10 |
| 20                  | 45 <sup>o</sup> 66 | 16                 | 42 <sup>o</sup> 76 | 3 <sup>o</sup> 308           | 0 <sup>o</sup> 011 | 6 <sup>o</sup> 72  | 269 <sup>o</sup> 66 |                             | 15 |
| 15                  | 46 <sup>o</sup> 12 | 12                 | 43 <sup>o</sup> 19 | 3 <sup>o</sup> 341           | 0 <sup>o</sup> 009 | 5 <sup>o</sup> 83  | 269 <sup>o</sup> 81 |                             | 20 |
| 11                  | 46 <sup>o</sup> 51 | 08                 | 43 <sup>o</sup> 55 | 3 <sup>o</sup> 370           | 0 <sup>o</sup> 006 | 4 <sup>o</sup> 88  | 270 <sup>o</sup> 01 |                             | 25 |
| 07                  | 46 <sup>o</sup> 84 | 05                 | 43 <sup>o</sup> 85 | 3 <sup>o</sup> 393           | 0 <sup>o</sup> 004 | 3 <sup>o</sup> 87  | 270 <sup>o</sup> 27 |                             | 30 |
| +0 <sup>o</sup> 04  | 47 <sup>o</sup> 08 | 0 <sup>o</sup> 03  | 44 <sup>o</sup> 08 | 3 <sup>o</sup> 411           | 0 <sup>o</sup> 002 | 2 <sup>o</sup> 82  | 270 <sup>o</sup> 76 | Dec.                        | 5  |
| + 0 <sup>o</sup> 01 | 47 <sup>o</sup> 24 | 01                 | 44 <sup>o</sup> 24 | 3 <sup>o</sup> 423           | 0 <sup>o</sup> 001 | 1 <sup>o</sup> 74  | 271 <sup>o</sup> 73 |                             | 10 |
| 00                  | 47 <sup>o</sup> 31 | 00                 | 44 <sup>o</sup> 31 | 3 <sup>o</sup> 428           | 0 <sup>o</sup> 000 | 0 <sup>o</sup> 62  | 276 <sup>o</sup> 12 |                             | 15 |
| 00                  | 47 <sup>o</sup> 29 | fol. l             | 44 <sup>o</sup> 29 | 3 <sup>o</sup> 426           | fol. l             | 0 <sup>o</sup> 48  | 80 <sup>o</sup> 33  |                             | 20 |
| - 0 <sup>o</sup> 01 | 47 <sup>o</sup> 18 | 01                 | 44 <sup>o</sup> 18 | 3 <sup>o</sup> 418           | 0 <sup>o</sup> 001 | 1 <sup>o</sup> 58  | 86 <sup>o</sup> 70  |                             | 25 |
| 03                  | 46 <sup>o</sup> 99 | 03                 | 44 <sup>o</sup> 00 | 3 <sup>o</sup> 403           | 0 <sup>o</sup> 002 | 2 <sup>o</sup> 66  | 87 <sup>o</sup> 83  |                             | 30 |

| Greenwich Noon. 1883. |    | Angle of Position of $\Upsilon$ 's Axis. | Latitude of Earth   of Sun above $\Upsilon$ 's Equator. |         | Annual Parallax $\Delta - L$ . | O - L. | Long. of $\Upsilon$ 's Central Meridian. |
|-----------------------|----|------------------------------------------|---------------------------------------------------------|---------|--------------------------------|--------|------------------------------------------|
| Jan.                  | 4  | 358°117                                  | + 2°366                                                 | + 2°260 | + 3°713                        | 51°069 | 29°54                                    |
|                       | 9  | 357°847                                  | 2°359                                                   | 2°245   | 4°721                          | 51°650 | 62°06                                    |
|                       | 14 | 357°603                                  | 2°350                                                   | 2°229   | 5°677                          | 52°177 | 94°48                                    |
|                       | 19 | 357°387                                  | 2°341                                                   | 2°213   | 6°566                          | 52°641 | 126°82                                   |
|                       | 24 | 357°204                                  | 2°330                                                   | 2°197   | 7°385                          | 53°034 | 159°05                                   |
|                       | 29 | 357°057                                  | 2°319                                                   | 2°181   | 8°131                          | 53°352 | 191°18                                   |
| Feb.                  | 3  | 356°947                                  | + 2°307                                                 | + 2°165 | + 8°796                        | 53°591 | 223°20                                   |
|                       | 8  | 356°874                                  | 2°294                                                   | 2°149   | 9°378                          | 53°748 | 255°12                                   |
|                       | 13 | 356°840                                  | 2°281                                                   | 2°133   | 9°875                          | 53°820 | 286°94                                   |
|                       | 18 | 356°846                                  | 2°267                                                   | 2°116   | 10°288                         | 53°807 | 318°65                                   |
|                       | 23 | 356°890                                  | 2°253                                                   | 2°100   | 10°617                         | 53°711 | 350°27                                   |
|                       | 28 | 356°972                                  | 2°238                                                   | 2°083   | 10°864                         | 53°534 | 21°80                                    |
| Mar.                  | 5  | 357°091                                  | + 2°223                                                 | + 2°066 | + 11°031                       | 53°277 | 53°25                                    |
|                       | 10 | 357°245                                  | 2°207                                                   | 2°049   | 11°122                         | 52°544 | 84°61                                    |
|                       | 15 | 357°433                                  | 2°191                                                   | 2°032   | 11°139                         | 52°537 | 115°90                                   |
|                       | 20 | 357°654                                  | 2°174                                                   | 2°015   | 11°086                         | 52°061 | 147°12                                   |
|                       | 25 | 357°906                                  | 2°157                                                   | 1°998   | 10°967                         | 51°520 | 178°28                                   |
|                       | 30 | 358°187                                  | 2°139                                                   | 1°981   | 10°787                         | 50°917 | 209°38                                   |
| Apr.                  | 4  | 358°495                                  | + 2°121                                                 | + 1°964 | + 10°549                       | 50°256 | 240°43                                   |
|                       | 9  | 358°829                                  | 2°102                                                   | 1°946   | 10°256                         | 49°541 | 271°43                                   |
|                       | 14 | 359°186                                  | 2°082                                                   | 1°929   | 9°912                          | 48°776 | 302°40                                   |
|                       | 19 | 359°565                                  | 2°062                                                   | 1°911   | 9°522                          | 47°964 | 333°34                                   |
|                       | 24 | 359°965                                  | 2°041                                                   | 1°893   | 9°089                          | 47°110 | 4°25                                     |
|                       | 29 | 0°383                                    | 2°019                                                   | 1°875   | 8°617                          | 46°218 | 35°13                                    |
| May                   | 4  | 0°817                                    | + 1°996                                                 | + 1°857 | + 8°110                        | 45°290 | 66°00                                    |
|                       | 9  | 1°267                                    | 1°973                                                   | 1°839   | 7°569                          | 44°330 | 96°85                                    |
|                       | 14 | 1°730                                    | 1°949                                                   | 1°821   | 6°997                          | 43°339 | 127°69                                   |
|                       | 19 | 2°204                                    | 1°924                                                   | 1°813   | 6°397                          | 42°318 | 158°53                                   |

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| Corr. for<br>Phase. | Equat.<br>Diam. | Phase<br>pr. limb. | Polar<br>Diam. | Diff. of<br>Limbs<br>in R.A. | Phase<br>pr. limb. | d.    | w.    | Greenwich<br>Noon.<br>1883. |
|---------------------|-----------------|--------------------|----------------|------------------------------|--------------------|-------|-------|-----------------------------|
| °                   | "               | "                  | "              | s                            | s                  | °     | °     |                             |
| -0.06               | 46.71           | 0.05               | 43.74          | 3.382                        | 0.004              | 3.71  | 88.30 | Jan. 4                      |
| .10                 | 46.35           | .08                | 43.40          | 3.356                        | .006               | 4.72  | 88.62 | 9                           |
| .14                 | 45.92           | .11                | 43.00          | 3.325                        | .008               | 5.67  | 88.82 | 14                          |
| .19                 | 45.43           | .15                | 42.54          | 3.289                        | .011               | 6.56  | 88.94 | 19                          |
| .24                 | 44.88           | .19                | 42.03          | 3.249                        | .013               | 7.38  | 89.05 | 24                          |
| .29                 | 44.30           | .22                | 41.48          | 3.207                        | .016               | 8.12  | 89.14 | 29                          |
|                     |                 |                    |                |                              |                    |       |       |                             |
| -0.34               | 43.68           | 0.26               | 40.90          | 3.162                        | .019               | 8.79  | 89.20 | Feb. 3                      |
| .38                 | 43.03           | .29                | 40.30          | 3.115                        | .021               | 9.37  | 89.25 | 8                           |
| .42                 | 42.37           | .31                | 39.68          | 3.068                        | .023               | 9.87  | 89.28 | 13                          |
| .46                 | 41.71           | .33                | 39.05          | 3.020                        | .024               | 10.28 | 89.31 | 18                          |
| .49                 | 41.04           | .35                | 38.42          | 2.972                        | .025               | 10.61 | 89.33 | 23                          |
| .51                 | 40.37           | .36                | 37.80          | 2.925                        | .026               | 10.86 | 89.35 | 28                          |
|                     |                 |                    |                |                              |                    |       |       |                             |
| -0.53               | 39.72           | 0.37               | 37.19          | 2.878                        | .027               | 11.02 | 89.35 | Mar. 5                      |
| .54                 | 39.08           | .37                | 36.59          | 2.832                        | .027               | 11.11 | 89.35 | 10                          |
| .54                 | 38.46           | .36                | 36.01          | 2.787                        | .026               | 11.13 | 89.34 | 15                          |
| .53                 | 37.86           | .35                | 35.45          | 2.745                        | .026               | 11.08 | 89.34 | 20                          |
| .52                 | 37.28           | .34                | 34.91          | 2.704                        | .025               | 10.96 | 89.33 | 25                          |
| .51                 | 36.73           | .32                | 34.39          | 2.665                        | .024               | 10.78 | 89.31 | 30                          |
|                     |                 |                    |                |                              |                    |       |       |                             |
| -0.49               | 36.20           | 0.31               | 33.90          | 2.627                        | .022               | 10.54 | 89.29 | Apr. 4                      |
| .46                 | 35.71           | .29                | 33.43          | 2.592                        | .021               | 10.25 | 89.27 | 9                           |
| .43                 | 35.24           | .26                | 32.99          | 2.559                        | .019               | 9.91  | 89.24 | 14                          |
| .39                 | 34.79           | .24                | 32.58          | 2.527                        | .017               | 9.52  | 89.21 | 19                          |
| .36                 | 34.38           | .22                | 32.20          | 2.498                        | .016               | 9.08  | 89.17 | 24                          |
| .32                 | 34.00           | .19                | 31.84          | 2.470                        | .014               | 8.61  | 89.14 | 29                          |
|                     |                 |                    |                |                              |                    |       |       |                             |
| -0.29               | 33.64           | 0.17               | 31.51          | 2.444                        | 0.012              | 8.11  | 89.10 | May 4                       |
| .25                 | 33.32           | .15                | 31.20          | 2.421                        | .011               | 7.57  | 89.06 | 9                           |
| .21                 | 33.02           | .12                | 30.92          | 2.399                        | .009               | 6.99  | 89.01 | 14                          |
| -0.18               | 32.75           | 0.10               | 30.67          | 2.379                        | 0.007              | 6.39  | 88.96 | 19                          |

The "Annual Parallax,"  $\Lambda - L$ , is the difference of the Jovicentric longitudes of the Sun and the Earth, reckoned in the plane of *Jupiter's* equator; the angle  $O - L$  is the difference of longitudes of *Jupiter's* vernal equinoctial point  $O$  and of the point of his equator which is in opposition to the Earth, or  $180^\circ + L - O$  is the Jovicentric longitude of the Earth reckoned from  $O$ .

The daily rate of rotation, on which the "Longitude of  $24$ 's Central Meridian" depends, is that adopted in last year's Ephemeris—namely,  $870^\circ.42$ —the corresponding period being  $9^h 55^m 34^s.47$ . As the motion of the great reddish spot is not uniform, but slackening, it will be better for the present purpose not to make any alteration. The successive values of the Long. of C. Mer. differ, for an interval of five days, by twelve rotations and some thirty degrees, so that, for instance, the first difference is  $4351^\circ.45$  and the last  $4350^\circ.84$ , which must be borne in mind in interpolating. If the "Corr. for Phase" is added to the "Longitude of  $24$ 's Central Meridian," or of the meridian directed to the Earth, the longitude of the meridian is found which bisects the illuminated disk of *Jupiter*. A list of the Greenwich mean times, when the adopted First (or Zero) Meridian passes the middle of the disk, will be given further on.

The assumed value of *Jupiter's* equatorial diameter is  $37''.60$  at the distance  $5.20273$ . The assumed proportion of the polar axis to the equatorial diameter is  $0.9363$ . As during the present apparition the axis of *Jupiter* is little inclined to the circle of declination, the difference of limbs in declination does not sensibly differ from the polar diameter, and the defect of illumination or the phase in declination is insensible. The last columns give the values of the auxiliary angles  $d$  and  $w$  required in the computations, as explained in vol. xl. p. 490 ff.

The inclinations  $\gamma$  and the ascending nodes  $\Gamma$  of the orbits of the four satellites in reference to the plane of *Jupiter's* equator are the following, the nodes being reckoned from  $O$ , the point of the vernal equinox of *Jupiter's* northern hemisphere:—

| 1882.   | Sat. I.          |               | Sat. II.         |                | Sat. III.        |                | Sat. IV.         |                |
|---------|------------------|---------------|------------------|----------------|------------------|----------------|------------------|----------------|
|         | $\gamma_1$       | $\Gamma_1$    | $\gamma_2$       | $\Gamma_2$     | $\gamma_3$       | $\Gamma_3$     | $\gamma_4$       | $\Gamma_4$     |
| Aug. 2  | $0^\circ 01' 12$ | $342^\circ 2$ | $0^\circ 47' 83$ | $344^\circ 04$ | $0^\circ 16' 88$ | $259^\circ 97$ | $0^\circ 32' 28$ | $331^\circ 06$ |
| Oct. 1  | $0^\circ 01' 11$ | $340^\circ 5$ | $0^\circ 47' 89$ | $342^\circ 10$ | $0^\circ 16' 77$ | $259^\circ 46$ | $0^\circ 32' 19$ | $331^\circ 06$ |
| Nov. 30 | $0^\circ 01' 10$ | $338^\circ 8$ | $0^\circ 47' 94$ | $340^\circ 16$ | $0^\circ 16' 67$ | $258^\circ 94$ | $0^\circ 32' 10$ | $331^\circ 05$ |
| 1883.   |                  |               |                  |                |                  |                |                  |                |
| Jan. 29 | $0^\circ 01' 10$ | $337^\circ 0$ | $0^\circ 47' 99$ | $338^\circ 22$ | $0^\circ 16' 58$ | $258^\circ 53$ | $0^\circ 32' 01$ | $331^\circ 01$ |
| Mar. 30 | $0^\circ 01' 09$ | $335^\circ 1$ | $0^\circ 48' 04$ | $336^\circ 28$ | $0^\circ 16' 49$ | $257^\circ 92$ | $0^\circ 31' 93$ | $330^\circ 96$ |
| May 29  | $0^\circ 01' 09$ | $333^\circ 0$ | $0^\circ 48' 09$ | $334^\circ 33$ | $0^\circ 16' 41$ | $257^\circ 42$ | $0^\circ 31' 87$ | $330^\circ 87$ |

If these values of  $\Gamma$  are added to the elongations  $O - L$  of the point  $O$  from superior conjunction, given before, the angles  $\Gamma + O - L$  are the elongations of the ascending nodes of the orbits from superior conjunction; and the latitudes of the satellites above the plane of *Jupiter's* equator are easily found, if their elongations are known.

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The following is a list of the Greenwich mean times, when the assumed First Meridian of *Jupiter* passes the middle of the illuminated disk:—

| 1882.  | h  | m    | 1882.   | h  | m    | 1882.   | h  | m    | 1882.    | h  | m      |
|--------|----|------|---------|----|------|---------|----|------|----------|----|--------|
| Aug. 2 | 16 | 52.0 | Aug. 18 | 0  | 11.0 | Sept. 2 | 7  | 29.2 | Sept. 17 | 14 | 46.5   |
| 3      | 2  | 47.6 |         | 10 | 6.7  |         | 17 | 24.8 |          | 18 | 0 42.0 |
|        | 12 | 43.3 |         | 20 | 2.3  | 3       | 3  | 20.4 |          | 10 | 37.6   |
|        | 22 | 39.0 | 19      | 5  | 57.9 |         | 13 | 16.1 |          | 20 | 33.2   |
| 4      | 8  | 34.6 |         | 15 | 53.6 |         | 23 | 11.7 | 19       | 6  | 28.8   |
|        | 18 | 30.3 | 20      | 1  | 49.2 | 4       | 9  | 7.3  |          | 16 | 24.3   |
| 5      | 4  | 25.9 |         | 11 | 44.8 |         | 19 | 2.9  | 20       | 2  | 19.9   |
|        | 14 | 21.6 |         | 21 | 40.5 | 5       | 4  | 58.5 |          | 12 | 15.5   |
| 6      | 0  | 17.2 | 21      | 7  | 36.1 |         | 14 | 54.1 |          | 22 | 11.1   |
|        | 10 | 12.9 |         | 7  | 31.7 | 6       | 0  | 49.7 | 21       | 8  | 6.7    |
|        | 20 | 8.6  | 22      | 3  | 27.4 |         | 10 | 45.3 |          | 18 | 2.3    |
| 7      | 6  | 4.2  |         | 13 | 23.0 |         | 20 | 40.9 | 22       | 3  | 57.9   |
|        | 15 | 59.9 |         | 23 | 18.6 | 7       | 6  | 36.5 |          | 13 | 53.5   |
| 8      | 1  | 55.5 | 23      | 9  | 14.3 |         | 16 | 32.1 |          | 23 | 49.0   |
|        | 11 | 51.2 |         | 19 | 9.9  | 8       | 2  | 27.7 | 23       | 9  | 44.6   |
|        | 21 | 46.8 | 24      | 5  | 5.5  |         | 12 | 23.3 |          | 19 | 40.2   |
| 9      | 7  | 42.5 |         | 15 | 1.2  |         | 22 | 18.9 | 24       | 5  | 35.8   |
|        | 17 | 38.1 | 25      | 0  | 56.8 | 9       | 8  | 14.6 |          | 15 | 31.4   |
| 10     | 3  | 33.8 |         | 10 | 52.4 |         | 18 | 10.2 | 25       | 1  | 26.9   |
|        | 13 | 29.4 |         | 20 | 48.1 | 10      | 4  | 5.8  |          | 11 | 22.5   |
|        | 23 | 25.1 | 26      | 6  | 43.7 |         | 14 | 1.4  |          | 21 | 18.1   |
| 11     | 9  | 20.7 |         | 16 | 39.3 |         | 23 | 57.0 | 26       | 7  | 13.7   |
|        | 19 | 16.4 | 27      | 2  | 34.9 | 11      | 9  | 52.6 |          | 17 | 9.2    |
| 12     | 5  | 12.0 |         | 12 | 30.6 |         | 19 | 48.2 | 27       | 3  | 4.8    |
|        | 15 | 7.7  |         | 22 | 26.2 | 12      | 5  | 43.8 |          | 13 | 0.4    |
| 13     | 1  | 3.3  | 28      | 8  | 21.8 |         | 15 | 39.3 |          | 22 | 55.9   |
|        | 10 | 59.0 |         | 18 | 17.4 | 13      | 1  | 34.9 | 28       | 8  | 51.5   |
|        | 20 | 54.6 | 29      | 4  | 13.0 |         | 11 | 30.5 |          | 18 | 47.1   |
| 14     | 6  | 50.3 |         | 14 | 8.7  |         | 21 | 26.1 | 29       | 4  | 42.6   |
|        | 16 | 45.9 | 30      | 0  | 4.3  | 14      | 7  | 21.7 |          | 14 | 38.2   |
| 15     | 2  | 41.5 |         | 9  | 59.9 |         | 17 | 17.3 | 30       | 0  | 33.8   |
|        | 12 | 37.2 |         | 19 | 55.5 | 15      | 3  | 12.9 |          | 10 | 29.3   |
|        | 22 | 32.8 | 31      | 5  | 51.1 |         | 13 | 8.5  |          | 20 | 24.9   |
| 16     | 8  | 28.5 |         | 15 | 46.7 |         | 23 | 4.1  | Oct. 1   | 6  | 20.5   |
|        | 18 | 24.1 | Sept. 1 | 1  | 42.4 | 16      | 8  | 59.7 |          | 16 | 16.0   |
| 17     | 4  | 19.7 |         | 11 | 38.0 |         | 18 | 55.3 | 2        | 2  | 11.6   |
|        | 14 | 15.4 |         | 21 | 33.6 | 17      | 4  | 50.9 |          | 12 | 7.2    |

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| 1882.  | h    | m    | 1882.   | h    | m    | 1882.  | h    | m    | 1882.   | h    | m    |
|--------|------|------|---------|------|------|--------|------|------|---------|------|------|
| Oct. 2 | 22   | 2'7  | Oct. 19 | 1    | 9'1  | Nov. 4 | 4    | 14'3 | Nov. 20 | 7    | 18'6 |
| 3      | 7    | 58'3 | 11      | 4'6  | 14   | 9'8    | 17   | 14'1 |         |      |      |
| 17     | 53'8 | 21   | 0'1     | 5    | 0    | 5'3    | 21   | 3    | 9'6     |      |      |
| 4      | 3    | 49'4 | 20      | 6    | 55'7 | 10     | 0'8  | 13   | 5'1     |      |      |
| 13     | 45'0 | 16   | 51'2    | 19   | 56'3 | 23     | 0'5  |      |         |      |      |
| 23     | 40'5 | 21   | 2       | 46'7 | 6    | 5      | 51'8 | 22   | 8       | 56'0 |      |
| 5      | 9    | 36'1 | 12      | 42'2 | 15   | 47'3   | 18   | 51'5 |         |      |      |
| 19     | 31'6 | 22   | 37'8    | 7    | 1    | 42'8   | 23   | 4    | 47'0    |      |      |
| 6      | 5    | 27'2 | 22      | 8    | 33'3 | 11     | 38'3 | 14   | 42'5    |      |      |
| 15     | 22'7 | 18   | 28'8    | 21   | 33'8 | 24     | 0    | 38'0 |         |      |      |
| 7      | 1    | 18'3 | 23      | 4    | 24'4 | 8      | 7    | 29'3 | 10      | 33'5 |      |
| 11     | 13'9 | 14   | 19'9    | 17   | 24'8 | 20     | 28'9 |      |         |      |      |
| 21     | 9'4  | 24   | 0       | 15'4 | 9    | 3      | 20'3 | 25   | 6       | 24'4 |      |
| 8      | 7    | 5'0  | 10      | 10'9 | 13   | 15'8   | 16   | 19'9 |         |      |      |
| 17     | 0'5  | 20   | 6'5     | 23   | 11'3 | 26     | 2    | 15'4 |         |      |      |
| 9      | 2    | 56'1 | 25      | 6    | 2'0  | 10     | 9    | 6'8  | 12      | 10'9 |      |
| 12     | 51'6 | 15   | 57'5    | 19   | 2'3  | 22     | 6'3  |      |         |      |      |
| 22     | 47'2 | 26   | 1       | 53'0 | 11   | 4      | 57'8 | 27   | 8       | 1'8  |      |
| 10     | 8    | 42'7 | 11      | 48'5 | 14   | 53'3   | 17   | 57'3 |         |      |      |
| 18     | 38'3 | 21   | 44'1    | 12   | 0    | 48'8   | 28   | 3    | 52'8    |      |      |
| 11     | 4    | 33'8 | 27      | 7    | 39'6 | 10     | 44'3 | 13   | 48'3    |      |      |
| 14     | 29'3 | 17   | 35'1    | 20   | 39'8 | 23     | 43'8 |      |         |      |      |
| 12     | 0    | 24'9 | 28      | 3    | 30'6 | 13     | 6    | 35'3 | 29      | 9    | 39'2 |
| 10     | 20'4 | 13   | 26'1    | 16   | 30'8 | 19     | 34'7 |      |         |      |      |
| 20     | 16'0 | 23   | 21'6    | 14   | 2    | 26'3   | 30   | 5    | 30'2    |      |      |
| 13     | 6    | 11'5 | 29      | 9    | 17'2 | 12     | 21'8 | 15   | 25'7    |      |      |
| 16     | 7'1  | 19   | 12'7    | 22   | 17'3 | Dec. 1 | 1    | 21'2 |         |      |      |
| 14     | 2    | 2'6  | 30      | 5    | 8'2  | 15     | 8    | 12'8 | 11      | 16'6 |      |
| 11     | 58'2 | 15   | 3'7     | 18   | 8'2  | 21     | 12'1 |      |         |      |      |
| 21     | 53'7 | 31   | 0       | 59'2 | 16   | 4      | 3'7  | 2    | 7       | 7'6  |      |
| 15     | 7    | 49'2 | 10      | 54'7 | 13   | 59'2   | 17   | 3'1  |         |      |      |
| 17     | 44'8 | 20   | 50'2    | 23   | 54'7 | 3      | 2    | 58'5 |         |      |      |
| 16     | 3    | 40'3 | Nov. 1  | 6    | 45'8 | 17     | 9    | 50'2 | 12      | 54'0 |      |
| 13     | 35'9 | 16   | 41'3    | 19   | 45'7 | 22     | 49'5 |      |         |      |      |
| 23     | 31'4 | 2    | 2       | 36'8 | 18   | 5      | 41'2 | 4    | 8       | 45'1 |      |
| 17     | 9    | 26'9 | 12      | 32'3 | 15   | 36'7   | 18   | 40'5 |         |      |      |
| 19     | 22'5 | 22   | 47'8    | 19   | 1    | 32'2   | 5    | 4    | 35'9    |      |      |
| 18     | 5    | 18'0 | 3       | 8    | 23'3 | 11     | 27'6 | 14   | 31'4    |      |      |
| 15     | 13'5 | 18   | 18'8    | 21   | 23'1 | 6      | 0    | 26'9 |         |      |      |

June 1882.

*Observations of Jupiter.*

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| 1882.  | h  | m    | 1882.   | h  | m      | 1883.  | h  | m    | 1883.   | h  | m    |
|--------|----|------|---------|----|--------|--------|----|------|---------|----|------|
| Dec. 6 | 10 | 22.4 | Dec. 22 | 13 | 26.1   | Jan. 7 | 6  | 35.4 | Jan. 23 | 9  | 41.7 |
|        | 20 | 17.9 |         | 23 | 21.6   |        | 16 | 30.9 |         | 19 | 37.3 |
| 7      | 6  | 13.3 | 23      | 9  | 17.1   | 8      | 2  | 26.5 | 24      | 5  | 32.8 |
|        | 16 | 8.8  |         | 19 | 12.6   |        | 12 | 22.0 |         | 15 | 28.4 |
| 8      | 2  | 4.3  | 24      | 5  | 8.1    |        | 22 | 17.5 | 25      | 1  | 24.0 |
|        | 11 | 59.8 |         | 15 | 3.6    | 9      | 8  | 13.0 |         | 11 | 19.6 |
|        | 21 | 55.2 | 25      | 0  | 59.1   |        | 18 | 8.6  |         | 21 | 15.1 |
| 9      | 7  | 50.7 |         | 10 | 54.6   | 10     | 4  | 4.1  | 26      | 7  | 10.7 |
|        | 17 | 46.2 |         | 20 | 50.1   |        | 13 | 59.6 |         | 17 | 6.3  |
| 10     | 3  | 41.7 | 26      | 6  | 45.6   |        | 23 | 55.2 | 27      | 3  | 1.9  |
|        | 13 | 37.2 |         | 16 | 41.1   | 11     | 9  | 50.7 |         | 12 | 57.4 |
|        | 23 | 32.6 | 27      | 2  | 36.6   |        | 19 | 46.2 |         | 22 | 53.0 |
| 11     | 9  | 28.1 |         | 12 | 32.1   | 12     | 5  | 41.8 | 28      | 8  | 48.6 |
|        | 19 | 23.6 |         | 22 | 27.6   |        | 15 | 37.3 |         | 18 | 44.2 |
| 12     | 5  | 19.1 | 28      | 8  | 23.1   | 13     | 1  | 32.8 | 29      | 4  | 39.8 |
|        | 15 | 14.6 |         | 18 | 18.6   |        | 11 | 28.4 |         | 14 | 35.4 |
| 13     | 1  | 10.0 | 29      | 4  | 14.1   |        | 21 | 23.9 | 30      | 0  | 31.0 |
|        | 11 | 5.5  |         | 14 | 9.6    | 14     | 7  | 19.5 |         | 10 | 26.5 |
|        | 21 | 1.0  | 30      | 0  | 5.1    |        | 17 | 15.0 |         | 20 | 22.1 |
| 14     | 6  | 56.5 |         | 10 | 0.6    | 15     | 3  | 10.6 | 31      | 6  | 17.7 |
|        | 16 | 52.0 |         | 19 | 56.1   |        | 13 | 6.1  |         | 16 | 13.3 |
| 15     | 2  | 47.4 | 31      | 5  | 51.6   |        | 23 | 1.7  | Feb. 1  | 2  | 8.9  |
|        | 12 | 42.9 |         | 15 | 47.1   | 16     | 8  | 57.2 |         | 12 | 4.5  |
|        | 22 | 38.4 | 1883.   |    |        |        | 18 | 52.8 |         | 22 | 0.1  |
| 16     | 8  | 33.9 | Jan. 1  | 1  | 42.6   | 17     | 4  | 48.3 | 2       | 7  | 55.0 |
|        | 18 | 29.4 |         | 11 | 38.2   |        | 14 | 43.9 |         | 17 | 51.3 |
| 17     | 4  | 24.9 |         | 21 | 33.7   | 18     | 0  | 39.4 | 3       | 3  | 46.9 |
|        | 14 | 20.3 |         | 2  | 7 29.2 |        | 10 | 35.0 |         | 13 | 42.5 |
| 18     | 0  | 15.8 |         | 17 | 24.7   |        | 20 | 30.5 |         | 23 | 38.1 |
|        | 10 | 11.3 |         | 3  | 3 20.2 | 19     | 6  | 26.1 | 4       | 9  | 33.7 |
|        | 20 | 6.8  |         | 13 | 15.2   |        | 16 | 21.6 |         | 19 | 29.3 |
| 19     | 6  | 2.3  |         | 23 | 11.2   | 20     | 2  | 17.2 | 5       | 5  | 24.9 |
|        | 15 | 57.7 |         | 4  | 9 6.8  |        | 12 | 12.7 |         | 15 | 20.5 |
| 20     | 1  | 53.2 |         | 19 | 2.3    |        | 22 | 8.3  | 6       | 1  | 16.1 |
|        | 11 | 48.7 |         | 5  | 4 57.8 | 21     | 8  | 3.9  |         | 11 | 11.7 |
|        | 21 | 44.2 |         | 14 | 53.3   |        | 17 | 59.4 |         | 21 | 7.3  |
| 21     | 7  | 39.7 |         | 6  | 0 48.8 | 22     | 3  | 55.0 | 7       | 7  | 2.9  |
|        | 17 | 35.2 |         | 10 | 44.4   |        | 13 | 50.6 |         | 16 | 58.5 |
| 22     | 3  | 30.7 |         | 20 | 39.9   |        | 23 | 46.1 | 8       | 2  | 54.2 |

| 1883. h m      | 1883. h m       | 1883. h m       | 1883. h m       |
|----------------|-----------------|-----------------|-----------------|
| Feb. 8 12 49.8 | Feb. 24 15 59.5 | Mar. 12 19 10.7 | Mar. 28 22 22.9 |
| 22 45.4        | 25 1 55.2       | 13 5 6.4        | 29 8 18.7       |
| 9 8 41.0       | 11 50.8         | 15 2.0          | 18 14.4         |
| 18 36.6        | 21 46.5         | 14 0 57.7       | 30 4 10.1       |
| 10 4 32.2      | 26 7 42.1       | 10 53.4         | 14 5.8          |
| 14 27.8        | 17 37.8         | 20 49.1         | 31 0 1.5        |
| 11 0 23.5      | 27 3 33.4       | 15 6 44.8       | 9 57.2          |
| 10 19.1        | 13 29.1         | 16 40.5         | 19 52.9         |
| 20 14.7        | 23 24.8         | 16 2 36.2       | Apr. 1 5 48.7   |
| 12 6 10.3      | 28 9 20.4       | 12 31.9         | 15 44.4         |
| 16 5.9         | 19 16.1         | 22 27.6         | 2 1 40.1        |
| 13 2 1.6       | Mar. 1 5 11.8   | 17 8 23.3       | 11 35.8         |
| 11 57.2        | 15 7.4          | 18 19.0         | 21 31.5         |
| 21 52.8        | 2 1 3.1         | 18 4 14.6       | 3 7 27.2        |
| 14 7 48.5      | 10 58.8         | 14 10.3         | 17 23.0         |
| 17 44.1        | 20 54.4         | 19 0 6.0        | 4 3 18.7        |
| 15 3 39.7      | 3 6 50.1        | 10 1.7          | 13 14.4         |
| 13 35.4        | 16 45.8         | 19 57.4         | 23 10.1         |
| 23 31.0        | 4 2 41.4        | 20 5 53.1       | 5 9 5.8         |
| 16 9 26.6      | 12 37.1         | 15 48.8         | 19 1.5          |
| 19 22.3        | 22 32.8         | 21 1 44.5       | 6 4 57.3        |
| 17 5 17.9      | 5 8 28.4        | 11 40.2         | 14 53.0         |
| 15 13.5        | 18 24.1         | 21 35.9         | 7 0 48.7        |
| 18 1 9.2       | 6 4 19.8        | 22 7 31.6       | 10 44.4         |
| 11 4.8         | 14 15.5         | 17 27.3         | 20 40.2         |
| 21 0.5         | 7 0 11.1        | 23 3 23.0       | 8 6 35.9        |
| 19 6 56.1      | 10 6.8          | 13 18.7         | 16 31.6         |
| 16 51.7        | 20 2.5          | 23 14.4         | 9 2 27.3        |
| 20 2 47.4      | 8 5 58.2        | 24 9 10.2       | 12 23.0         |
| 12 43.0        | 15 53.9         | 19 5.9          | 22 18.8         |
| 22 38.7        | 9 1 49.5        | 25 5 1.6        | 10 8 14.5       |
| 21 8 34.3      | 11 45.2         | 14 57.3         | 18 10.2         |
| 18 30.0        | 21 40.9         | 26 0 53.0       | 11 4 5.9        |
| 22 4 25.6      | 10 7 36.6       | 10 48.7         | 14 1.7          |
| 14 21.3        | 17 32.3         | 20 44.4         | 23 57.4         |
| 23 0 16.9      | 11 3 27.9       | 27 6 40.1       | 12 9 53.1       |
| 10 12.6        | 13 23.6         | 16 35.8         | 19 48.9         |
| 20 8.2         | 23 19.3         | 28 2 31.5       | 13 5 44.6       |
| 24 6 3.9       | 12 9 15.0       | 12 27.2         | 15 40.3         |